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RESEARCH ARTICLE.....

A chromosomal investigation of three species of *Papilio* (Papilionidae:Lepidoptera)

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ABSTRACT..... Lepidoptera is one of the largest orders of the class Insecta which includes butterflies and moths and is economically, biologically and aesthetically an important order. Chromosome structure and size are of great significance in karyological studies and have relevance to evolution, speciation and chromosome organization. Karyotypic studies in Lepidoptera has been a difficult task due to small dot- like chromosomes of similar sizes. The chromosome cytology of Indian Lepidoptera is very much limited. Chromosome studies in three species of butterflies (*Papilio polytes, Papilio demoleus, Papilio glaucus*) revealed 60 as diploid chromosome number.

KEY WORDS..... Chromosome, Diploid chromosome number

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INTRODUCTION.....

Family Paplionidae is an extensive family of pre-eminently tropical butterflies including some of the most magnificent of all insects. The family shows deviations in respect of the distribution of the chromosome numbers from the order Lepidoptera. Although intense investigations on chromosome cytology of Lepidoptera have been carried out in different parts of the world, work in India is almost negligible (Rishi, 1973 and Nayak, 1975). The present communication deals with karyological study of somatic chromosomes from male and female and meiotic stages from male of three species of butterflies belonging to family Paplionidae.

RESEARCH METHODS.....

Larvae of three species of butterflies were collected from their respective host plants and were reared in cages. The fifth instar larvae and early pupae were found suitable for chromosomal investigation. Brain ganglia from male and female and testes from male were dissected out and fixed in Carnoy's fixative. Slides were prepared following the technique of Rishi *et al*. (1997) and stained in Giemsa stain. Slides were examined under binocular research microscope, good stages were photographed.

RESEARCH FINDINGS AND ANALYSIS.....

The results obtained from the present investigation as well as relevant discussion have been summarized under the following heads :

Paplio polytes :

The diploid number (2n) at somatic metaphase, both

male and female consisted of 60 small, dot-like chromosomes (Fig.1 and 2). In both size and morphology, the chromosomes were almost identical. The meiotic prophase in zygotene and pachytene showed elongated chromosomes, but their number was not countable at this stage. The pachytene bivalents showed lengthwise pairing of homologous chromosomes but exact position of chiasmata was not clear. The chromosomes appeared more and more condensed as they passed through diplotene to metaphase I. The diakinetic bivalents showed chiasma bearing shapes like cross, rod, ring, thereby suggesting positive occurrence of chiasmata. The metaphase I bivalents were at maximum state of condensation and were oval in shape and aligned at equator of the spindle with clearly visible spindle apparatus. Anaphasic movement was also seen (Fig.3, 4 and 5).

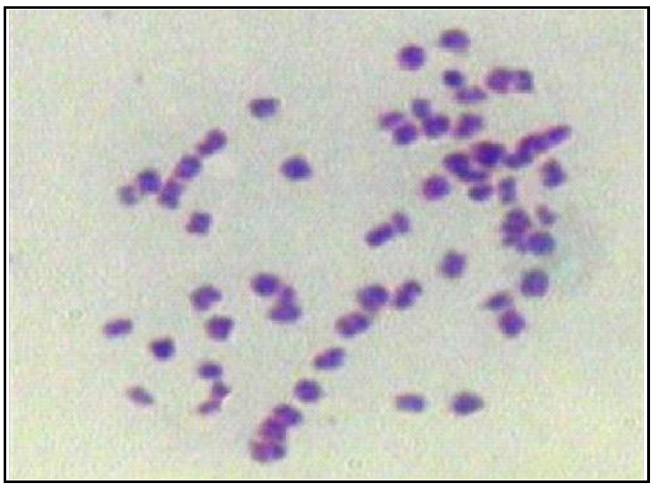

Fig. 1 : Somatic metaphase *Papilio polytes*-male

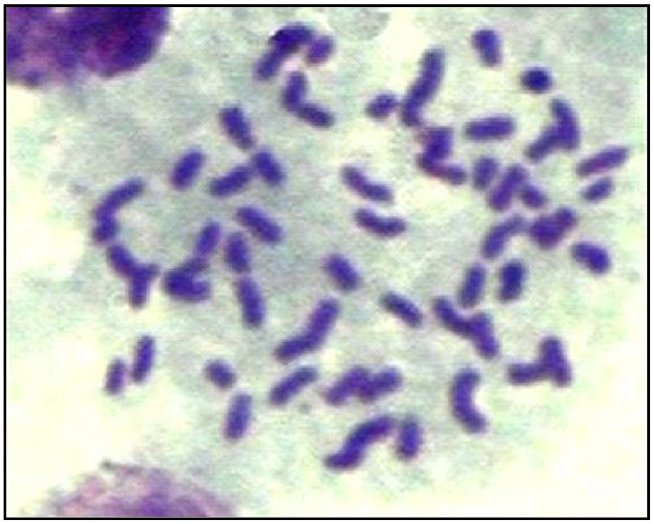

Fig. 2 : Somatic metaphase *Papilio polytes*-female

***Paplio demoleus* :**

This species also showed the diploid number to be 60 from the somatic metaphases of both male and female larvae (Fig. 6 and 7). Good prophase stages were scored which confirmed the diploid number of the species (Fig. 8, 9 and 10).

***Paplio glaucus* :**

2n=60, somatic metaphase showed 60 number of

Fig. 3 : Pachytene

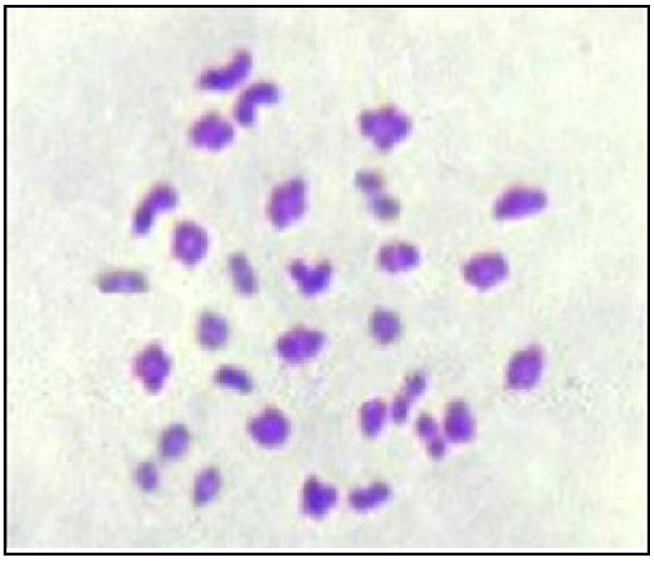

Fig. 4 : Diakinesis

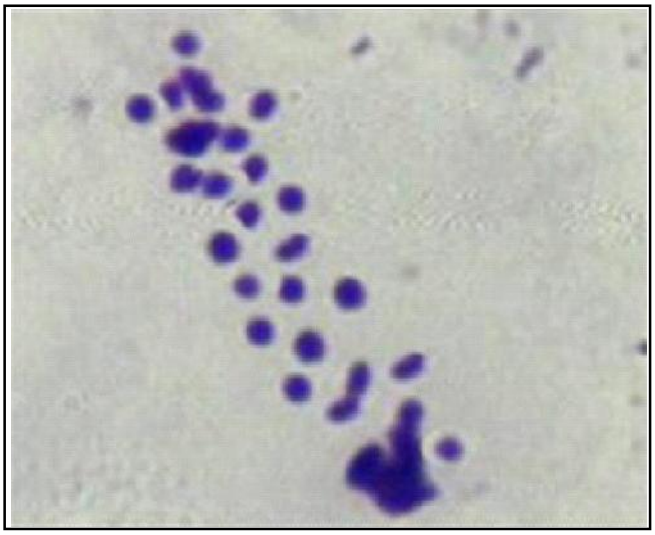

Fig. 5 : Metaphase I

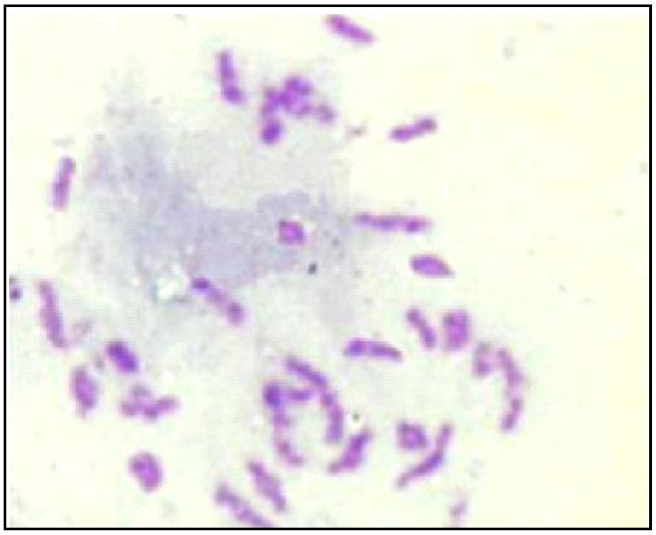

Fig. 8 : Diplotene

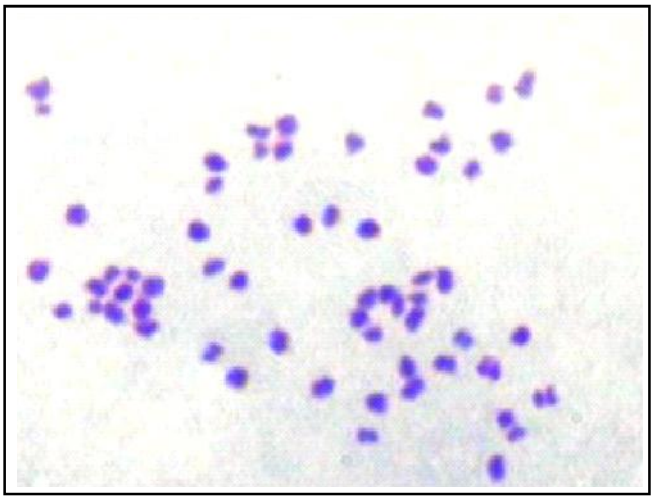

Fig. 6 : Somatic metaphase *Papilio demoleus*-male

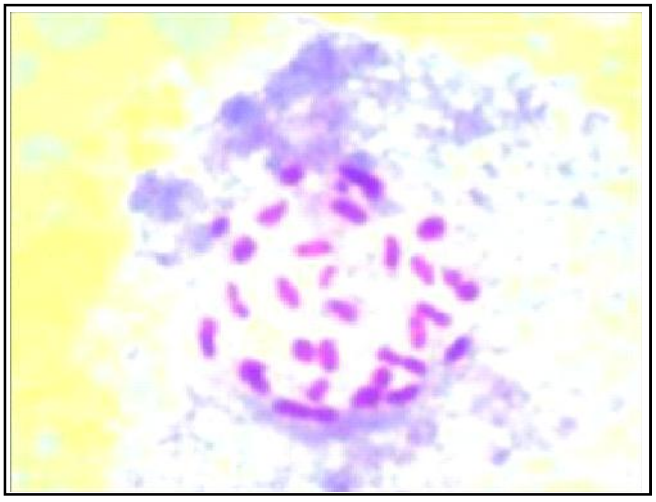

Fig. 9 : Diakinesis

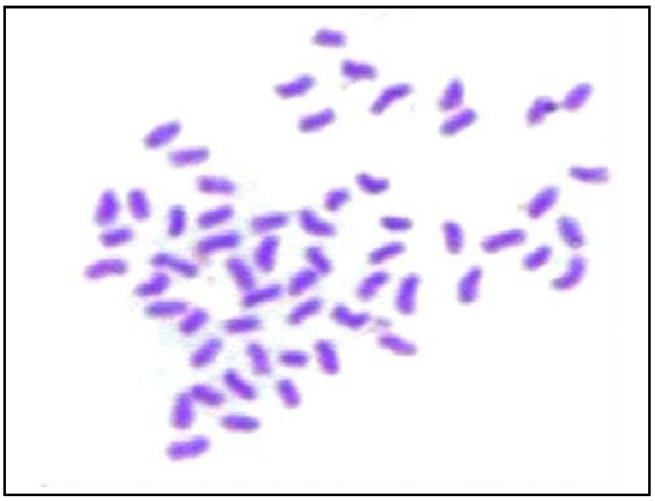

Fig. 7 : Somatic metaphase *Papilio demoleus*-female

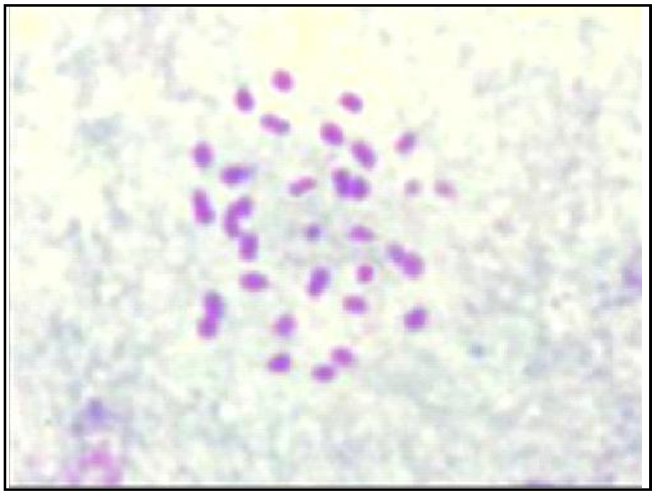

Fig. 10 : Metaphase I

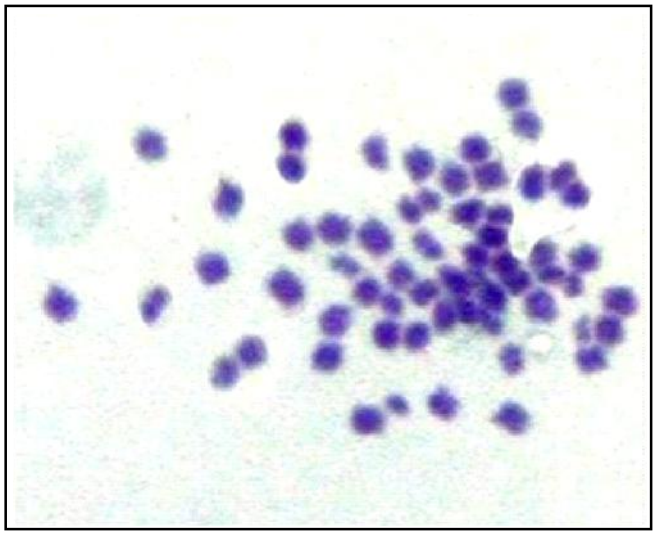

Fig. 11 : Somatic metaphase *Papilio glaucus*-male

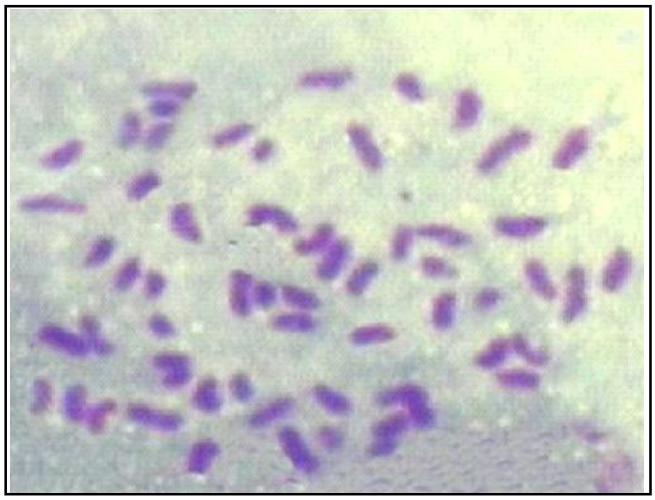

Fig. 12 : Somatic metaphase *Papilio glaucus*-female

Fig. 13 : Pachytene

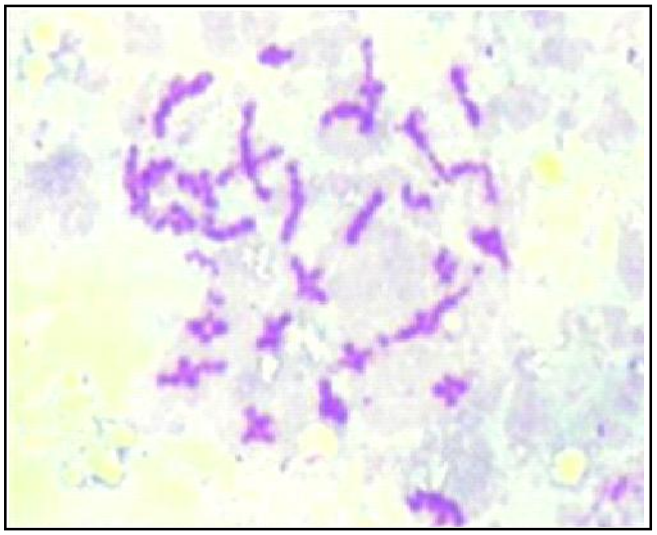

Fig. 14 : Diplotene

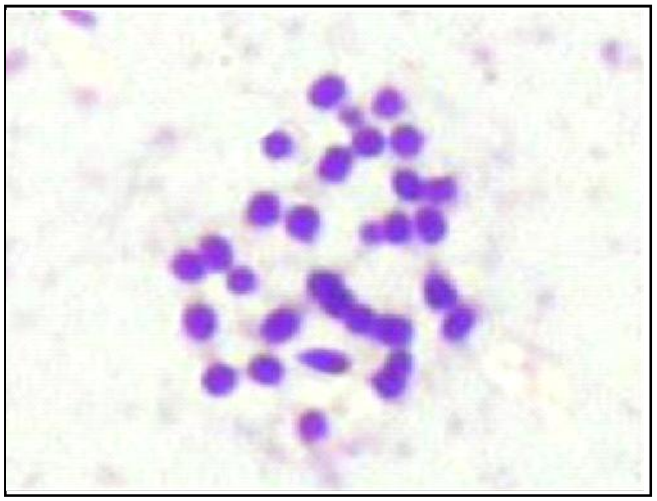

Fig. 15 : Metaphase I

chromosomes (Fig.11 and 12). Metaphase I showed 30 bivalents. Anaphase I was normal in good number of dividing cells (Fig. 13, 14 and 15).

It includes about 600 known species but only eighty-four species of this family have been worked out cytologically. The modal chromosome number of this family appears to be 30 as 72 species possessed this number in their haploid set (Trentini and Marini, 1986; Rishi, 1975 and Izumi and Seto, 1995).This family shows little variation in the chromosome number in the congeneric forms, in contrast to the condition prevalent in other families. Thus, the family Papilionidae, as a whole, is remarkable in showing almost constant haploid numbers in the various species. Any variations, which are there in some of the species, are quite insignificant. This family,

therefore, shows deviations in respect of the distribution of the chromosome numbers from the order Lepidoptera.The haploid chromosome number 30 deviates from 31 which is the modal number for the order Lepidoptera.

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